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Arnab Halder: Mussel-inspired bio functionalization of graphene for electrochemical sensor applications

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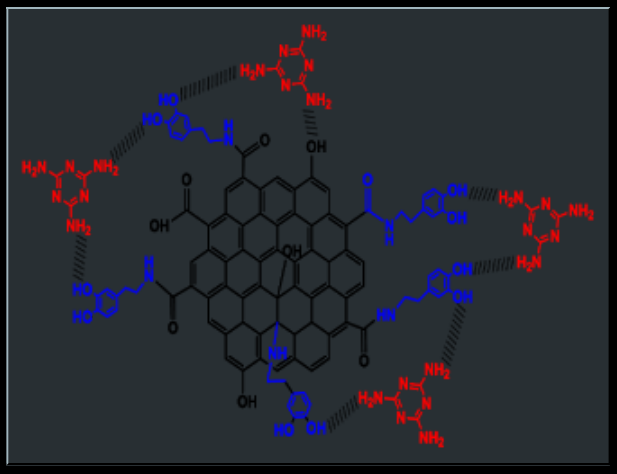

Graphene has emerged as a wonder material in many fields ranging from physics and chemistry to biology in the past decade. [1] Wet-chemical synthesis methods offer low-cost production and facile functionalization of single-layered and solution suspended biocompatible graphene. [2] We here used a biologically active molecule “Dopamine” (DA) for the biofunctionalization. The unique properties of dopamine (DA) allow to be used simultaneously as a reducing agent for GO reduction and as a capping ligand to stabilize and decorate the resulting reduced GO (RGO) surface for further functionalization. Moreover, as the dopamine moiety contains a redox couple group, the hybrid material can be highly applicable to electrochemical sensing. The catechol group of dopamine was selectively protected to prevent from self-polymerization and undesirable side chain reactions. [3] After the coupling reaction with graphene oxide, deprotection reaction was carried out to recover free catechol groups in the RGO-DA nanocomposite. The HQ/Q-redox couple in DA moiety can be highly applicable to electrochemical sensing. Here we used this functionalized material for the electrochemical sensing of melamine with ultra-high sensitivity.

1. D. R. Dreyer, S. Park, C. W. Bielawski and R. S. Ruoff, *Chemical Society Reviews* **2010**, *39*, 228-240.
2. N. Zhu, S. Han, S. Gan, J. Ulstrup and Q. Chi, *Advanced Functional Materials* **2013**, *23*, 5297-5306.
3. A. Halder, M. Zhang, G. Olsen and Q. Chi, Manuscript under preparation, **2015**

Arnab Halder is currently a PhD student of Nanochemistry group at the Department of Chemistry, Technical University of Denmark. His research focuses on the biocompatible engineering functionalization of Graphene nanomaterials and their application in chemosensors and biosensors.

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